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Accuracy of measurement system for 3D analysis of cleft palate morphology.
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Landmark positioning on three-dimensional (3D) images, obtained through surface laser scanning of a single cleft palate plaster model, has been validated in a previous study by Foong et *al.* (1999). The aim of the present study is to determine the reliability of computer-derived measurements on 3D images of cleft palate models with different palatal morphology. Two duplicate plaster models of a complete unilateral cleft lip and palate infant, derived from alginate impressions taken at the third month prior to lip surgery and at the ninth month prior to palatal closure, were digitised with the Cyberware 3030R-HIREZ surface laser scanner. Nine anthropological landmarks were marked permanently on the models prior to scanning which served as visual cues on the digitised image for landmark localisation. Each plaster model was scanned ten times, and on-line landmark digitisation was carried out for each of the ten scans to determine three linear and three angular measurements. A single set of manual measurements for the linear and angular variables, verified by two investigators, was made with the original models and served as a control for the computer-derived measurements. Each laser-scanned image was calibrated against the original model to eliminate measurement errors resulting from image magnification and distortion. Measurements were subjected to independent *t*-test with statistical significance set at $p<0.01$. The anterior cleft width, defined by the linear measurement AC-AC', showed the highest standard deviation for computer-derived measurements on both 3D images at 10.5% and 20.6%, respectively. The standard deviations for the other two linear and three angular measurements were less than 1.5%. Computer-derived and manual linear and angular measurements were comparable for the pre-lip surgery plaster model ($0.15<p<0.81$). For the pre-palatal surgery model, the difference between manual and computer-derived measurements was statistically significant ($p<0.01$) for only one angular variable, AC'-P'-P. Computer-derived linear and angular measurements on 3D images of unilateral cleft lip and palate plaster models are highly repeatable except for the measurement defining the anterior cleft width. While the Cyberware 3030R-HIREZ surface laser scanner is an accurate system for documenting morphological changes of the cleft palate deformity, improvement in visual access for digitising landmarks defining the anterior cleft width is needed. This study is supported by RP 950372 and RP950625.

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Jaw and tooth abnormalities detected on panoramic radiographs in New Zealand children aged 10-15 years. W.CHOLITGUL,* and B.K. DRUMMOND (Chulalongkorn University, Bangkok, Thailand and University of Otago, Dunedin, New Zealand)

The aim of this study was to assess the panoramic radiographs of a group of New Zealand children aged 10-15 years-of-age in order to determine the occurrence of jaw and tooth abnormalities. A survey of 1608 panoramic radiographs of a group of New Zealand children and adolescents aged 10 to 15 years (797 males and 811 females) was carried out to determine the occurrence of tooth and jaw abnormalities in this group who were attending the School of Dentistry clinics for treatment. 21% females and 17.3% males, showed some abnormalities. Only seven (0.4%) radiographs showed bony abnormalities. The abnormalities detected included condylar disturbances (3), unidentified masses (2), bilateral cleft palate (1), dentigerous cyst (1).There were 879 teeth diagnosed with abnormalities on 331 radiographs. The proportion of teeth with abnormalities and the normal teeth was 1:51. The more common abnormalities detected were malposed teeth, missing teeth, mis-shaped teeth and teeth with crown hypoplasia. Hence we conclude that this study has demonstrated the value of panoramic radiography in detecting abnormalities in dental development in particular, and would support the recommendations that are to be found in contemporary textbooks on paediatric dentistry on the use of panoramic radiography to aid in the diagnosis of dental development.

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A Study of Head and Body Posture of Distal-End Edentulous Patients.
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Apart from the importance of musculoskeletal system, the dental occlusion also takes part in control the postural balance. Since numerous teeth missing can cause the impairment of muscle activity, it might gradually effect the balance of posture caused by the difference of muscle tension between both sides. The objective of this study is to investigate the relationship of the posture of body, head and neck in the patients who have posterior distal-end edentulous arch. Twenty subjects with full dentition and normal class I occlusion were selected as a control group and fifteen subjects with posterior distal-end edentulous participated in this study. The subjects were asked to stand in front of the 5 cm^2 mesh board for taking the photograph of the frontal view (whole body). The body axis, head and neck axis, shoulders level, interpupillary line were recorded to analyze the difference of the axis compared to the vertical and horizontal axis.The results show that the head and neck axis of the posterior distal-end edentulous patients shift significantly from the body axis than the control group (1.97° and 0.82°, respectively ,$p<0.05$). The axis of shoulder level compared to the horizontal axis in the two groups were insignificantly different (1.27° and 1.35°, respectively, $p>0.05$). It can be concluded from the study that a change of the head and body posture can be expected in patients with posterior distal-end edentulous. Supported by Dental research Fund, Faculty of Dentistry, Chulalongkorn University

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Effects of Low-energy Laser Treatment on Enamel and Dentin Hardness. **C.S. HSU, H SHI* and A YAP, (Faculty of Dentistry, National University of Singapore, Singapore)**

There is now scientific evidence that laser treatment may increase the caries resistance of enamel. Recently, a 98% protection against enamel mineral loss was reported with an artificial caries model (Hsu and Wefel, 1998). The purpose of this study was to investigate the effect of the low-energy CO_2 laser treatment on the hardness of enamel and dentin. Immediately after extraction, a human premolar was disinfected, sectioned longitudinally, mounted, and polished. Baseline microhardness readings (KHN) were taken every 200 µm along two lines in enamel and dentine with a Future-Tech FM-7 digital microhardness tester (load = 100 gf, dwell time = 30 seconds). The central line ran from the cusp tip to pulp horn, extending into dentin. The second (left) line was positioned 500 µm parallel to this line. After baseline readings, the tooth was then subjected to four times of laser irradiation using the following parameters: power = 0.02 Watts, focal spot diameter = 1 mm, pulse width = 0.1 seconds, energy density = 0.397 J/cm^2. Post-treatment measurements were carried out at sites 100 µm away than the sties previously measured within the same line. The baseline data was analyzed with paired t-tests and showed no significant difference in hardness within 200 µm divisions in enamel and dentin on both lines, before and after laser treatment (all $p > 0.05$). The hardness of enamel was significantly increased in the central and left lines with $p<0.001$ (N=21), and $p=0.031$ (N=19), respectively. In dentin, laser treatment did not have a significant effect on hardness in both lines (both $p>0.05$). In conclusion, the low-energy laser treatment that inhibited enamel demineralization also can increase the hardness of enamel. The effect of laser treatment on dentin hardness was not statistically significant.

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Preliminary comparison of Laser-Induced Fluoreescence and Microradiography in Evaluation of Enamel Demineralization. **CS HSU, CK Chionh*, YK Beng, CK Chng, KM Choy, TE Seah, and H SHI (Faculty of Dentistry, National University of Singapore, Singapore)**

Caries diagnosis has become more critical when quality control emerged as the keystone of Health Care Reform. Traditional diagnostic systems used for caries detection have faced tremendous challenges as the demand for higher reliability and validity surfaced recently. The search for a better system/method for caries diagnosis has become an important research issue. The purpose of this study was to investigate the in-vitro reliability and validity of a newly developed non-invasive caries detector. Twelve tooth halves were selected and covered with acid-resistant varnish except two window areas. The left windows received CO_2 laser treatments, with 20 Hz and 0.334 J/cm^2, and the right windows served as the non-lasing control (Hsu and Wefel, 1998). All the tooth halves were then submitted to a pH cycling model to create artificial caries-like lesions, as stated in a previous study. All the tooth halves were then cut longitudinally to obtain thin sections from each lesion for quantification of lesion depth and mineral loss by using microradiography (MRG). After the MRG quantification of demineralization, the lesions on teeth were further assessed by five dental students using a new caries detector (Diagnodent™, KaVo, Germany). Each tooth half was first tested once by each examiner successively. This procedure was repeated two more times before proceeding to the next tooth. This was done until all the tooth halves were tested. The reading of laser-induced fluorescence (LIF) by Diagnodent™ was used as the dependent variable. Examiner and sequence of measurements were the independent variables. A factorial ANOVA revealed that both examiner and sequence of measurement did not significantly affect the reading of LIF (both $p > 0.05$). It is indicated that the lesions treated with laser has less demineralization, and the controls have greater mineral loss ($p<0.001$). For lased lesions, the Pearson correlation coefficient (r) was 0.697 and 0.708, in the comparison of LIF with enumeration of mineral loss and lesion depth in MRG, respectively (both $p<0.05$). For non-lased lesions, the r was 0.499 and 0.149, in the comparison of LIF with enumeration of mineral loss and lesion depth in MRG, respectively (both $p > 0.05$). It is suggested in this study that the new non-invasive caries detector may be used validly to detect the incipient enamel smooth caries, but not for the advanced lesions. Diagnodent™ can also be reliably used for enumeration of LIF by different examiners.

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Factors associated with unfavorable periodontal conditions in treated periodontal patients.
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A retrospective study was conducted to identify possible risk factors associated with further tooth loss and/or relatively greater proportions of sites with deep probing pocket depths (PPD) in treated periodontal patients. The study included a baseline at the conclusion of active periodontal therapy, a questionnaire and a clinical re-examination. The participants were 100 Chinese subjects (40 male, 60 female), aged 34 to 77 years (mean 50.3±9.4 years), who showed initially favorable responses to periodontal therapy provided 3 to 12 years previously. Data collected through the questionnaire included background information, general health status, tobacco smoking, denture wearing habits, current oral hygiene habits, any follow-up dental care and further tooth loss after previous periodontal treatment. Clinical examination included teeth present and PPD at six sites around each tooth. Statistical analysis was performed using a general linear model. 11% of the subjects were smokers. 36% had primary education or less, 53% had secondary school and 11% had tertiary. 258 teeth in these 100 subjects had been lost, of which 195 (75.6%) were lost due to periodontal disease. Proportion of sites with PPD≥ 6mm varied among the subjects from 0 to 26.8% (mean 3.04±4.58%). There was a significant positive correlation between further tooth loss due to all reasons and age ($p=0.001$), smoking-pack-years ($p=0.002$) and denture wearing ($p=0.028$) and a negative correlation with higher education levels ($p=0.035$). Tooth loss due to periodontal disease was also positively correlated with smoking-pack-years ($p<0.001$) and age ($p=0.002$). Percentage of sites with PPD≥ 6mm was significantly positively correlated with percentage of sites with plaque ($p=0.003$) and denture wearing ($p=0.034$). This study confirms that tobacco smoking is a risk factor for, and that denture wearing is associated with, further tooth loss in treated periodontal patients. This project was supported by the University of Hong Kong (URC and CRCG).

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Predominant cultivable subgingival microbiota of HIV-infected ethnic Chinese C.S.P. Tsang* & L.P. Samaranayake (Faculty of Dentistry, University of Hong Kong)

The objectives of the study were to characterize the predominant cultivable subgingival microbiota in a group of HIV-infected ethnic Chinese and to compare it with a HIV-free group. The subgingival microflora of 21 HIV-infected and 11 HIV-free individuals were studied using the direct microscopic and anaerobic culture methods. The major organisms found using phase contrast microscopy were non-motile rods, in both HIV-infected and HIV-free groups (49.1% and 40.9%, respectively), followed by cocci (24.1% and 30.5%, respectively). Motile curved rods were almost three times higher in the HIV-infected group. Gram stain examination yielded similar results, where Gram-negative rods were the major morphotype observed both in the HIV-infected and HIV-free groups (33.6% and 27.1%, respectively) followed by Gram-positive cocci (19.9% and 21.1%, respectively). In both groups, about 40% of the cultivable microflora were strict anaerobes. Strictly anaerobic Gram-negative rods were the major bacterial type isolated (33.9% and 39.6% in healthy and diseased, respectively) followed by facultatively anaerobic Gram-positive cocci (21.2% and 22.5% in healthy and diseased, respectively). There were no significant differences between the diseased and healthy groups when analyzed either in relation to the morphotype distribution or Gram stain morphology or oxygen tolerance. These findings agree with previous studies which report that subgingival bacteria of HIV-infected individuals (with or without periodontal disease) is similar to those found in healthy, HIV-free individuals (with or without periodontal disease).
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Microbial colonization of spent Minocycline Strips – A Preliminary Report.
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This study investigated the colonization pattern of oral microbes on Minocycline strips used as an adjunct in non-surgical periodontal therapy. Minocycline (1.4 mg/strip) and control strips were applied into all residual pockets (PD ≥ 5 mm, ≥ 4 pockets/subject) of adult periodontitis patients one month after a course of non-surgical periodontal therapy. The clinical experiment was conducted in a double-blind randomised parallel fashion. Strips were inserted into the pockets for 3 days each time on 2 occasions. Chlorhexidine mouthrinses were used during the week of strip placement. Spent strips were randomly recovered from 10 of the 32 participants at Days 3 and 6, and were subjected to i) anaerobic culture using ETSA, ii) Coliforms culture using MacConkey agar, iii) yeast culture using Sabouraud's dextrose agar. The mean proportion of gram-positive species (% total cfu/strip) among all groups (test vs control; 3 vs 6 days) ranges from 65-89% with gram-positive cocci being the most predominant species isolated (52-74%). The corresponding values for gram-negative rods were 10-29%. Minimal amounts of gram-negative cocci were recovered and one yeast was isolated on only one occasion. No difference could be found regarding the prevalence and quantity of bacteria from all 4 groups as per anaerobic culture. However, significantly increased prevalence of coliform bacteria was found on day-3-spent-minocycline strips versus control (75% vs 0%, Fisher exact test, $P = 0.03$). Such difference was not observable among day-6-spent strips (40% vs 80% $P = 0.52$). The preliminary findings indicate that the micro-organisms colonizing the spent test Minocycline or control strips comprised flora compatible with periodontal health which probably reflect the ecology of the corresponding subgingival flora. The emergence of coliform bacteria warrants the removal of the minocycline strips on days 3 and 6 as practised.